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(54) APPARATUS FOR PLACING LATERAL GASTRO INTESTINAL ANASTOMOSES

(57) Abstract:

The present invention relates to a surgical instrument designed for placing gastro-intestinal anastomoses by mechanical means.

The existing instruments for similar purposes have a number of disadvantages, namely:

1. Prior to suturing it is necessary to dissect the lumens of the organs to be united to the entire length of a supposed anastomosis; this reduces the aseptic nature of the operation; the instruments allow placing of shallow sutures only (mucosa touching mucosa).

2. Placing of the front and rear rows of sutures is [illegible] a multiple motion operation.

3. Such devices are bulky and complicated. Their operation involves a great number of elements.

These disadvantages are avoided in the present instrument. The object of the invention is to provide an instrument for suturing the gastric and intestinal walls with U-shaped metal staples (preferably fabricated from tantalo-niobium wire), when placing lateral anastomoses, that ensures:

1. Placing of deep sunk sutures (serosa touching serosa) from the side of the mucosa by introduction of the working tips of the instrument into the lumens of the organs to be stitched through the punctures in the walls.

To achieve this the working tips or jaws of the instrument have a shape and cross-section similar to those of the crushing forceps jaws, and are provided with pointed ends and a sharp-tipped adjustment pin at one of the jaws to prevent side displacement of the jaws at the moment of

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suturing.

2. Alternative pushing out of staples by single pushers, moving in the guides in the working jaw of the clinching half of the instrument by means of a wedge which can be drawn through a longitudinal groove in the body of the said working jaw. This design of the stitching mechanism reduces the effort necessary to be applied to the jaw when bending staples in placing sutures, and reduces the cross-section of the working jaws.

3. Simultaneous placing of the front and rear rows of sutures. This is attained due to the parallel arrangement of the staple slots and the corresponding radial recesses or notches for bending the ends of staples in the jaws of the instrument, the wedge being arranged to exert pressure simultaneously on the pushers of both the front and the rear rows, as it moves.

4. Severing of the walls of the organs to be stitched between the front and rear rows of sutures by means of a cutting blade or knife set into the wedge. For the protruding part of the cutting blade in the working jaw of the supporting half between the two rows of radial notches for bending the staple ends there is provided a longitudinal groove.

Further objects and advantages of the present invention will be described hereinafter and referred to in the appended claims. The invention will now be more particularly described in connection with the accompanying drawings which illustrate a preferred embodiment of the invention and in which:

Fig. 1 is a side elevational view, partly in

section, showing the assembled instrument.

Fig. 2 is a top elevation of the instrument.

Fig. 3 is a cross-sectional view along the line III-III of Fig. 1.

Fig. 4 is a cross-sectional view along the line IV-IV of Fig. 1.

Fig. 5 is a view of the clinching part of the instrument.

Fig. 6 is a side view showing the wedge with associated knife.

Fig. 7 is a side view of the supporting part of the instrument.

Fig. 8 is a diagrammatic view showing the manner in which the staples are moved by the wedge and the tissue is severed by the cutting blade.

Fig. 9 is a cross-sectional view taken along the line IX-IX of Fig. 8.

Fig. 10 is a cross-sectional view of a lateral intestinal anastomosis.

Referring to the drawings the instrument consists of two main parts: the clinching part 1 and the supporting part 2, joined togehher by a hinge, which consists of an axle mounted on the supporting part 2 and an open groove 4 formed in the clinching part 1. The two parts of the instrument consist of working jaws 5 and 6 and handles 7 and 8 respectively. To ensure correct alignment of the instrument jaws when bringing them together, the handle 7 of the clinching part 1 is provided with two cheeks 9 and the handle 8 of the supporting part 2 is provided with a projection 10 and an adjustment pin 11. When bringing the

two parts of the instrument together the projection 10 moves between the cheeks 9, and the sharp-pointed adjustment pin 11 is received in a longitudinal groove 12 formed in the working jaw 5. The working jaw 5 of the clinching part 1 is provided with a body 13 having a longitudinal groove 12 and guides 14 arranged on its opposite side walls. Straps 16 provided with transverse slots 17 are secured to the inner surfaces of the side walls of body 13 by means of screws 15. The slots 17 of the straps 16 are positioned adjacent the guides 14 of the body 13, thereby forming two rows of slots closed from their sides for reception of the U-shaped metal staples 18 and the pushers 19.

On the working jaw 6 of the supporting part 2 there are provided two rows of notches 20 corresponding to the slots on the jaw of the clinching part 1, designed for bending the staple ends during the stitching operations. Between the rows of radial notches 20 is located a longitudinal groove 21. For forcing the staples 18 out of the slots 17 on the working jaw 5 there is provided a removable wedge 22, adapted to be guided by the handle 7 with the aid of the pin 23 and groove 21. For convenience of operation the wedge 22 is provided with a projection "a" forming a support for the surgeon's fingers.

Severing of the sutured tissue between the two rows of sutures (front and rear) is ensured by a cutting blade 25 mounted in the wedge 22. To lock the instrument jaws in a closed position there is provided a lever 26 which is pivotally connected to the handle 8 of the supporting part of the instrument. Upon pressing on the support "b" of lever 26, the lever turns around the axis 27 and its

surface "c" engages the pin 28 thereby to lock the jaws in a closed position. To avoid any unintentional movement of the wedge, and thus avoid any accidental movement of staples from out of the slots of the working jaw, the wedge is locked in its initial position by means of a safety lock consisting of a stop pin 29, with associated biassing spring 30, secured to the handle of the clinching part of the instrument by means of a clamp 31.

To place a lateral gastro-intestinal anastomosis or an intestinal anastomosis in the walls of the organs to be united a hole is pierced in each wall by means of a scalpel and the separated working jaws of the instrument are introduced into their cavities through these holes.

Thereafter the two parts of the instrument with the organs to be sutured fitted on the working jaws thereof, are brought together, locked in their closed position by turning the lever 26 and the projection "a" of the wedge 22 is pressed. Upon pressing projection "a" the wedge slips off the stop pin 29 and, moving along the handle, enters the longitudinal groove 12 in the body 13. In its passage along the groove, the wedge 22 exerts pressure on the supporting parts of the pushers 19 in both rows. The pushers, in their turn, force the staples 18 out of the slots 17. The sharp tips of the staples puncture the tissue of the gastric-intestinal or intestinal walls 32, depending upon the type of the anastomosis applied, clamped between the instrument jaws, engage the radial notches 20 of the instrument jaw 6 and bend to assume a B-shape, thus making the stitches of a suture. Simultaneous with the suturing operation, the knife or cutting blade 25 severs the tissue

(see Figs. 8, 9 and 10) between the row of stitches thus uniting the cavities of the sutured organs.

This is the end of the operation performed by the instrument. After the removal of the instrument jaws from the operational wound the holes pierced in the walls of the organs to permit passage of the instrument jaws are stitched by means of a needle and thread.

The embddiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. An instrument for placing lateral gastro-intestinal anastomoses consisting of two parts, namely a clinching part and a supporting part, working jaws of the clinching and supporting parts having slots to receive U-shaped staples for stitching and radial notches for bending staple ends, and stitching means for pushing the said staples out of the said slots of the working jaw, said stitching means mounted on the clinching part of the instrument, the said working jaws being shaped similar to the jaws of a crusher with pointed tips and one of the jaws being provided with a sharp-tipped adjusting pin, to place sunken sutures, serosa touching serosa, from the side of the mucosa upon introduction of the said working jaws into the lumens of the organs to be sutured through punctures formed in their walls and to avoid side displacement of the jaws at the moment of stitching.

2. An instrument according to claim 1 wherein said stitching means include single pushers slidingly seated in guides provided on the body of the working jaw of said clinching part, and a wedge hinged to the clinching part, said wedge adapted to move single pushers from out of said guides when moved through a longitudinal groove formed in the working jaw of the clinching part.

3. An instrument according to claim 1, wherein said clinching and supporting parts of the instrument are provided respectively with parallel front and rear rows of slots for staples and radial notches for bending ends of staples in the jaws and a wedge mounted for movement through a longitudinal groove formed in the working jaw of said clinching part, said wedge operable simultaneously to force pushers from said front and rear rows for simultaneously placing the front and rear rows of sutures.

4. An instrument according to claim 3, wherein said wedge carries a knife adapted to sever the walls of the sutured organs between the front and rear rows of sutures during the stitching operation and wherein the working jaws of the supporting part is provided with a longitudinal groove adapted to receive a protruding part of the said knife, said groove being located between two rows of radial notches for bending ends of the staples.

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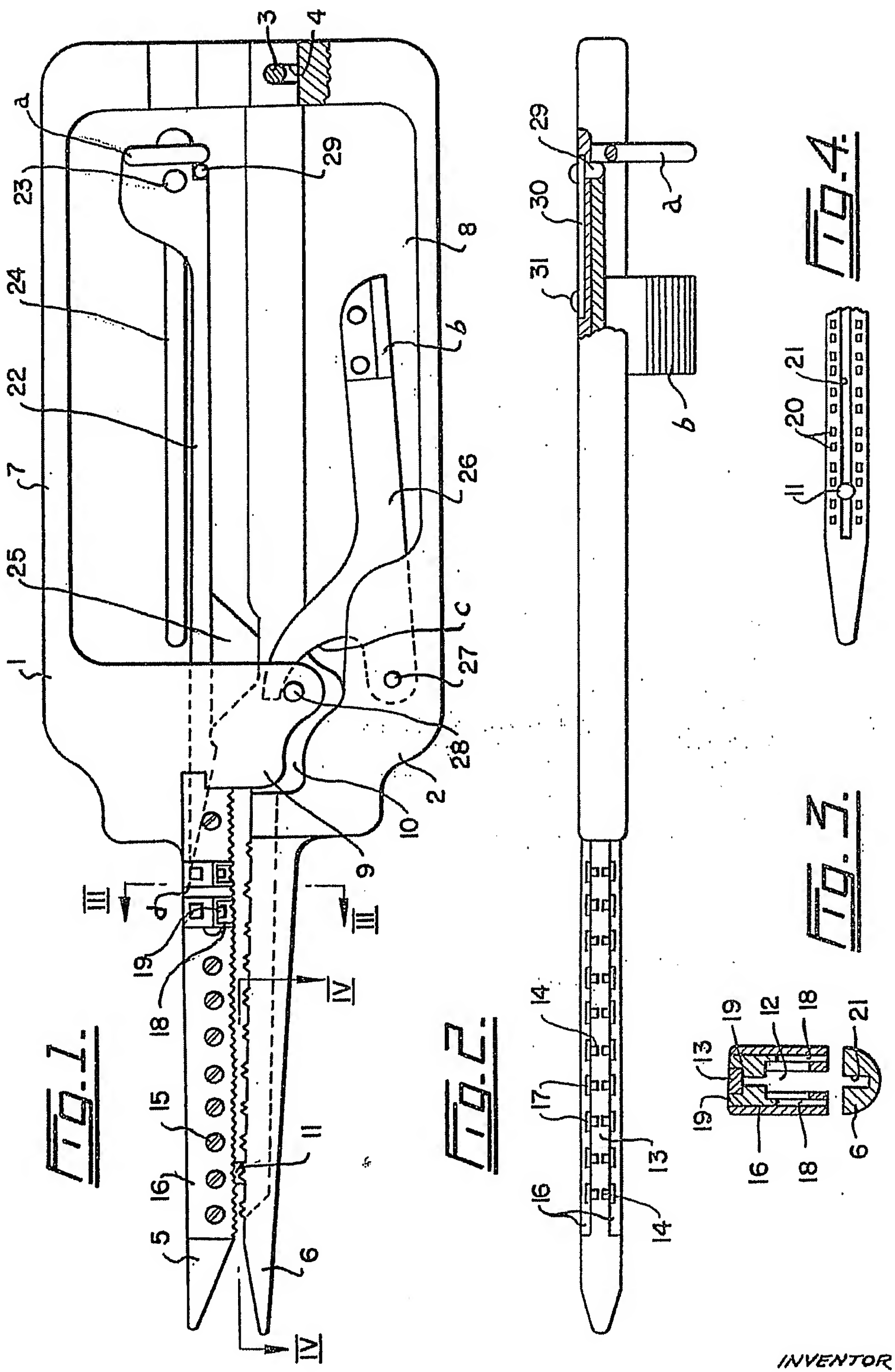

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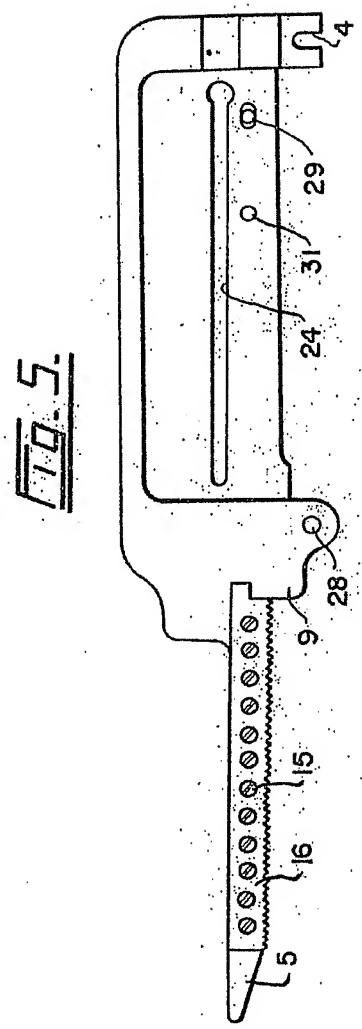

FIG. 5.

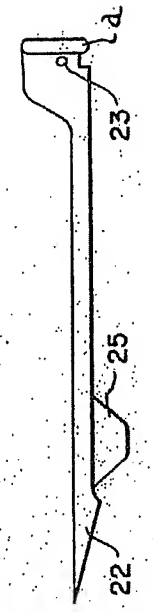

FIG. 6.

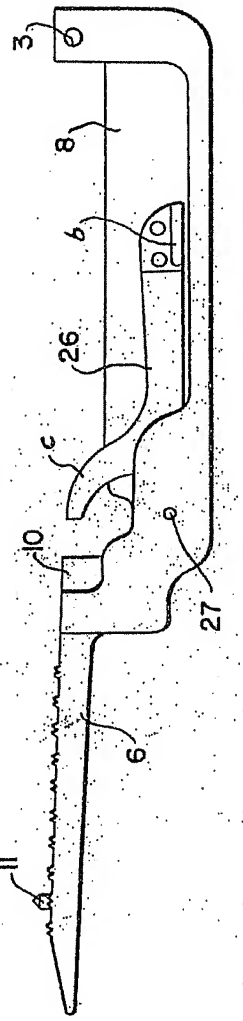

FIG. 7.

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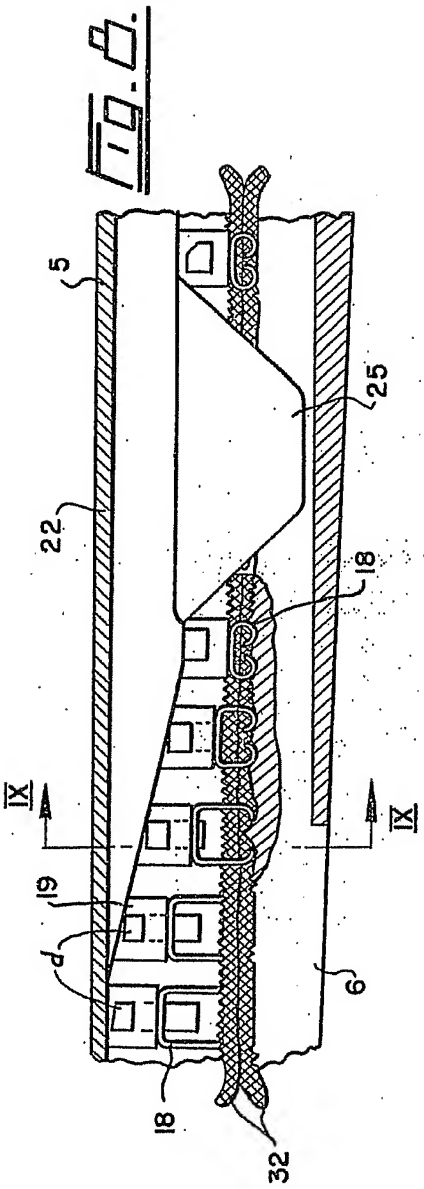

FIG. 8.

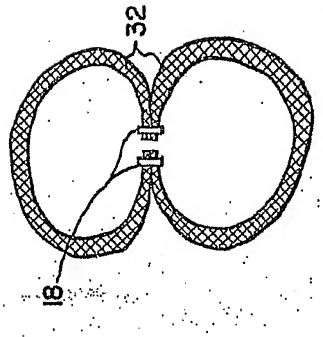

FIG. 10.

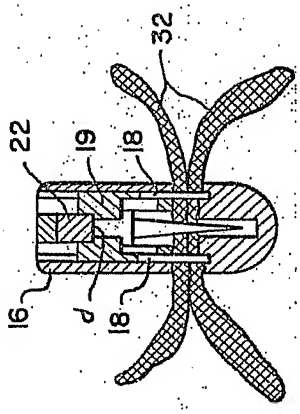

FIG. 9.

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